AMENDMENTS TO THE CLAIMS

Please amend claims 16, 19, 20 and 22, cancel claims 1-15 and 23 and add claims 24-37, as set forth in the following listing of claims, which will replace all prior versions, and listings, of claims in the present application.

Listing of Claims

1-15. (Canceled)

16. (Currently Amended) A method of isolating a subpopulation of cells from a cell population using a microfluidic system comprising;

identifying cells from a population that have a desired phenotype; and

isolating said cells from cells that do not have the desired phenotype using a microfluidic cell sorting device.

17. (Original) The method of claim 16, wherein said cell population is culture of isolated primary cells.

18. (Original) The method of claim 16, wherein the cell population is a cell culture.

19. (Currently Amended) A method of isolating a subpopulation of cells to be used in cell transplantation comprising;

identifying cells with a desired phenotype;

isolating said cells using a ~~microfludic~~ microfluidic cell sorting device;

thereby isolating a subpopulation of cells to be used in transplantation.

20. (Currently Amended) A method of isolating a ~~supbpopulation~~ subpopulation of cells to be genetically modified comprising,

identifying a subpopulation of cells based on a desired phenotype in a cell population;

isolating said cells using a ~~microfludic~~ microfluidic cell sorting device;

thereby isolating a subpopulation of cells to be genetically modified.

21. (Original) The method of claim 20, wherein said cells that are isolated to be genetically modified are reimplanted in a subject.

22. (Currently Amended) A method of isolating a subpopulation of cells comprising,
identifying a subpopulation of cells displaying a cell cycle stage specific marker;
isolating said cells using a ~~microfludic~~ microfluidic cell sorting device;
thereby isolating a subpopulation of cells that are in the same phase of the cell cycle.

23. (Canceled)

24. (New) The method of claim 16, further comprising the steps of:
passing the isolated cells having the desired phenotype to a mixing and incubation region of the microfluidic cell sorting device;
introducing a test compound to the mixing and incubation region.

25. (New) The method of claim 24, further comprising the step of:
detecting the effect of the test compound on the isolated cells having the desired phenotype in a detection region of the microfluidic cell sorting device.

26. (New) The method of claim 16, wherein the step of isolating cells having the desired phenotype from cells that do not have the desired phenotype comprises:
conveying a mixture including cells having the desired phenotype and cells that do not have the desired phenotype through a sorting channel of the microfluidic cell sorting device;
applying a pressure pulse to a cell having the desired phenotype to deflect the cell having the desired phenotype into a first outlet of the sorting channel while cells not having the desired phenotype flow into a second outlet of the sorting channel.

27. (New) The method of claim 26, wherein the pressure pulse is applied by deflecting a meniscus formed by fluid at an intersection between a side channel in communication with the sorting channel and a sealed chamber positioned adjacent to the side channel.

28. (New) The method of claim 19, further comprising the steps of removing the isolated cells from the microfluidic cell sorting device and transplanting the isolated cells.

29. (New) The method of claim 19, wherein the step of isolating cells having the desired phenotype comprises:

conveying a mixture including cells having the desired phenotype and cells that do not have the desired phenotype through a sorting channel of the microfluidic cell sorting device;

applying a pressure pulse to a cell having the desired phenotype to deflect the cell having the desired phenotype into a first outlet of the sorting channel while cells not having the desired phenotype flow into a second outlet of the sorting channel.

30. (New) The method of claim 29, wherein the pressure pulse is applied by deflecting a meniscus formed by fluid at an intersection between a side channel in communication with the sorting channel and a sealed chamber positioned adjacent to the side channel.

31. (New) The method of claim 20, further comprising the step genetically modifying the isolated cells in the microfluidic cell sorting device.

32. (New) The method of claim 20, wherein the step of isolating cells having the desired phenotype comprises:

conveying a mixture including cells having the desired phenotype and cells that do not have the desired phenotype through a sorting channel of the microfluidic cell sorting device;

applying a pressure pulse to a cell having the desired phenotype to deflect the cell having the desired phenotype into a first outlet of the sorting channel while cells not having the desired phenotype flow into a second outlet of the sorting channel.

33. (New) The method of claim 32, wherein the pressure pulse is applied by deflecting a meniscus formed by fluid at an intersection between a side channel in communication with the sorting channel and a sealed chamber positioned adjacent to the side channel.

34. (New) The method of claim 22, further comprising the steps of:

passing the subpopulation of cells that are in the same phase of the cell cycle to a mixing and incubation region in the microfluidic cell sorting device; and

introducing a test compound to the mixing and incubation region.

35. (New) The method of claim 22, wherein the step of isolating cells displaying a cell cycle stage specific marker comprises:

conveying a mixture including cells displaying a cell cycle stage specific marker and cells that do not display the cell cycle stage specific marker through a sorting channel of the microfluidic cell sorting device;

applying a pressure pulse to a cell displaying the cell cycle stage specific marker to deflect the cell displaying the cell cycle stage specific marker into a first outlet of the sorting channel while cells not displaying the cell cycle stage specific marker flow into a second outlet of the sorting channel.

36. (New) The method of claim 35, wherein the pressure pulse is applied by deflecting a meniscus formed by fluid at an intersection between a side channel in communication with the sorting channel and a sealed chamber positioned adjacent to the side channel.

37. (New) A method of isolating a subpopulation of cells to be used in cell transplantation comprising the steps of:

identifying cells with a desired phenotype; and

isolating said cells from cells not having the desired phenotype using a microfluidic device, wherein the step of isolating comprises applying a pressure pulse to cells having the desired phenotype in a channel to deflect cells having the desired phenotype into a first outlet while cells not having the desired phenotype flow into a second outlet,

thereby isolating a subpopulation of cells to be used in transplantation.